TEST-4

1 If velocity of the gas particles increases by twice. The pressure exerted by the gas?

- A: Increase by two times
- B: Decrease by two times
- C: Increasy by four times
- D: Decrease by four times.

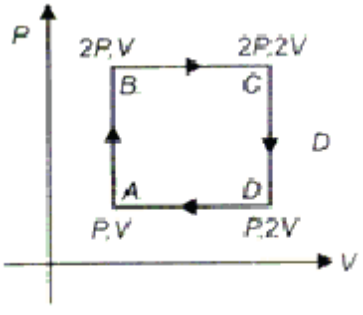
2 For isothermal process, change in internal energy is?

- A: Always positive.
- B: Always Negative
- C: Zero.
- D: Equal to the work done.

3 At a given temperature entropy change is directly proportional to?

- A: At a constant temperature entropy remains constant.
- B: Work done.
- C: Heat transfer.
- D: Change in pressure.

4 An ideal monoatomic gas is taken around the cycle ABCDA, as shown in PV diagram. The work done during the cycle is given by:



- A: 1/2 PV
- B: PV
- C: 2PV
- D: 4PV

5 At what scale both Celsius and Fahrenheit give the same reading?

- A: -100
- B: -90
- C: -40
- D: 0

6 For irreversible processes?

- A: Entropy increases.
- B: Entropy decreases.
- C: Entropy remains constant.
- D: None of the above.

7 When the state of gas changes without change in temperature, the gass is said to undergo :

- A: Isothermal process
- B: Adiabetic process
- C: Isochoric process
- D: Isobaric process

8 Internal energy of an ideal gas system is equal to?

- A: Kinetic energy of the molecules.
- B: Potential energy of the molecules.
- C: Absolute temperature of the gas.
- D: Vibrational + Rotational energy.

9 Keeping every thing constant, if the volume of a container is doubled the pressure?

- A: Remains same.
- B: Halves
- C: Doubles
- D: Increase four times.

10 In the expression P = Constant * K.E. The constant is equal to?

- A: 1/3 * Number of molecules per unit volume
- B: 2/3 * Number of molecules per unit volume
- C: 2/3 * Number of molecules in the container
- D: 1/3 * Number of molecules in the container

11 Molar specific heat of the gases is defined at constant volume or constant pressure because?

- A: This is required by the 2nd law of thermodynamics.
- B: To account for the universal gas constant (R)
- C: Rise in temperature results in the change in volume or pressure of the gasses.
- D: $C_p > C_v$

12 Which of the following statement is true?

- A: Work done on the system is positive and work done by the system is negative.
- B: Work done on the system is negative and work done by the system is positive.
- C: Work done on the system and by the system is always positive.
- D: Heat transferred to the system is negative and heat transferred from the system to surroundings is positive.

13 Which of the following is true about carnot engine?

- A: Its efficiency is 100%
- B: There is no change in internal energy.
- C: Its efficiency depends on the nature of working substance.
- D: Both B & C.

14 Which of the following could be assumed as adiabatic process?

- A: Constant mixing of hot gas with cold gas.
- B: Rapid expansion of air.
- C: Slow expansion of air.
- D: Steam formation in the steam engine.

15 Which of the following is true for the molar specific heat of the gases?

- A: ΔU for $C_p > \Delta U$ for C_v
- B: ΔU for $C_p < \Delta U$ for C_v
- C: ΔU for $C_p = \Delta U$ for C_v
- D: Not enough information given to make any conclusion about ΔU for C_p and C_v

16 We can not use the heat of oceans to convert it to work because?

- A: Oceans are too large.
- B: Heat content is too big to handle.
- C: There is no heat sink available.
- D: Both A & C.

17 In the expression PV=nRT, n is defined as?

- A: 2/3 * number of molecules per unit volume.
- B: Moles of gas contained in volume V at absolute temperature T = 0.
- C: Moles of gas contained in volume V at absolute temperature T.
- D: Moles of gas contained in volume V at temperature T.

18 Mathematical model of gases makes which of the following assumptions?

- A: A finite volume of gas consists of very large number of molecules.
- B: The size of molecules is much smaller than the seperation of the molecules.
- C: Collision between gas molecules is perfectly elastic.
- D: All of the above.

19 Sum of all forms of molecular energy is also known as?

- A: Kinetic Energy
- B: Potential Energy
- C: Internal Energy
- D: Total Energy

20 What will be the mathematical form of first law of thermodynamics for a system whose variation of volume by pressure is shown? (The graph is for an isothermal process)

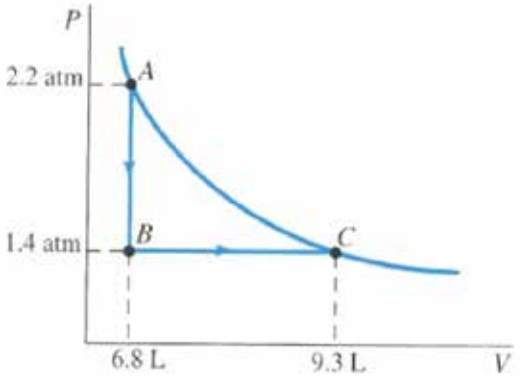


FIGURE 15-27 Problem 9.

- A: Q=U
- B: U=W
- C: Q=U/W
- D: Q=W

ELECTROSTATISTICS

TEST-1

1. **Capacity of a capacitor depends upon?**

   - A: Size of plate
   - B: Distance between plates
   - C: Nature of dielectric between plates
   - D: All of the above.

2. **If σ is the uniform surface charged density then electric field intensity due to an infinite sheet of charge is?**

   - A: $\sigma * 2\varepsilon_0$
   - B: $\sigma * \varepsilon_0$
   - C: $\sigma / 2\varepsilon_0$
   - D: σ / ε_0

3. **Gravitational force does not depend on?**

   - A: Distance
   - B: Mass
   - C: Medium
   - D: It depends on all of the above.

4. **A basic technique when applying gauss's law is to?**

   - A: Assume the field is constant in direction
   - B: Assume the field is constant is magnitude
   - C: Assume the field is constant in both magnitude and direction
   - D: Construct and imaginary surface around the charge

5. **A capacitor may be considered as a device for?**

   - A: Storing energy.
   - B: Increasing resistance.
   - C: Decreasing resistance.
   - D: None of the above.

6. **If a mica sheet is place between the plates of a capacitor, its capacitance will?**

   - A: Increase.
   - B: Decrease.
   - C: Remain same.
   - D: None of the above.

7. **The electric intensity is expressed in unit of N/C or?**

   - A: V/m
   - B: Joules
   - C: V.m
   - D: None of the above.

8. Number of electric field lines per unit area passing parallel to Guassian surface is?

- A: Directly proportional to the magnitude of electric field.
- B: Inversely proportional to the magnitude of electric field.
- C: Directly proportional to the electric flux density.
- D: Zero.

9. Constant of proportionality k in the formula for force between the two charges depends on?

- A: Value of the charge.
- B: Nature of medium between the charges.
- C: Source of electric field.
- D: Both B & C.

10. Which of the following is true about electric field lines?

i) Electric field lines start from positive charge and end on negative charge.
ii) Tangent to the field line gives the direction of field at that point.
iii) Electric field lines never cross each other.

- A: i only.
- B: ii only
- C: i and ii only
- D: i, ii and iii.

11. The force per unit charge is known as?

- A: Electric flux
- B: Electric potential
- C: Electric field intensity.
- D: Electric current.

12. Which of the following is a vector quantity?

- A: Electric Charge
- B: Electric Field
- C: Electric Potential
- D: Electric Current

13. Which of the following is a field free region?

- A: Outside a hollow charged shere.
- B: Inside a hollow charged shpere.
- C: Near an infinite sheet of charge
- D: In the middle of two opposite charged plates.

14. What are the SI units of electric field intensity?

- A: N/C
- B: V/C
- C: NC
- D: VC

15. Total electric flux through a closed surface depends upon?

i) Charge enclosed ii) Medium iii) Geometry of the surface

- A: i only
- B: ii only
- C: i and ii only
- D: i, ii and iii.

16. If work done on moving a unit positive charge from point A to B in an electric field is 5J the potential difference between A and B is?

- A: 1 V
- B: 5 V
- C: 10 V
- D: We need information about electric field intensity to give an answer.

17. Two charged spheres are separated by 2 mm. Which of the following would yield the greatest attractive force?

- A: +1q and +4q
- B: –1q and –4q
- C: +2q and +2q
- D: +2q and –2q

18. The energy stored in the capacitor is?

- A: ½ CV^2
- B: ½ C^2 V
- C: ½ QV^2
- D: ½ Q^2V

19. Presence of di-electric?

- A: Reduces the electrostatic force between charged particles.
- B: Increases the electrostatic force between charged particles.
- C: Has no effect on the electrostatic force between charged particles.
- D: May increase or decrease the electrostatic force between charged particles.

20. The value of minimum possible charge is?

- A: 1 C
- B: 1.6×10^{-19} C
- C: 3.2×10^{-19} C
- D: There is no such value as minimum possible charge.

Test-2

1. **What will be the effect on the capacitance of the capacitor if area of each plate is double while separation between the plates is halved?**

   - A: Capacitance remains same
   - B: Capacitance becomes double
   - C: Capacitance reduces to half
   - D: Capacitance becomes four times

2. **To measure an electric field, the test charge q_0 has to be very small because?**

   - A: Large charge may distort the field to be measure.
   - B: Electric field is only measureable for small charges.
   - C: Small charges provide inexpensive way of measuring electric field.
   - D: None of the above.

3. **Time constant for capacitor is defined as?**

   - A: Time taken by the capacitor to deposit 0.25 times the equilibrium charge.
   - B: Time taken by the capacitor to deposit 0.47 times the equilibrium charge.
   - C: Time taken by the capacitor to deposit 0.63 times the equilibrium charge.
   - D: Time taken by the capacitor to deposit 0.75 times the equilibrium charge.

4. **If distance between two charges is increased by 3 times the electrostatic force between them?**

   - A: Increases by 3 times
   - B: Decreases by 3 times.
   - C: Increases by 9 times
   - D: Decreases by 9 times.

5. **The charge determined by the Milikan's experiment is given by?**

   - A: mgd / V
   - B: m / gdv
   - C: md / dV
   - D: mV / dg

6. **Which of the following statement is true?**

   i) **Both gravitational and electrical forces are inversely proportional to distace between points.**
   ii) **Gravitational is much weaker than electrical force**
   iii) **Electrical force and gravitational force are both medium dependent**

   - A: i only
   - B: i and ii only
   - C: i and iii only
   - D: i, ii and iii only.

7. **Two opposite charges of C columb are separated by distance D. What is the electric potential at midway between them?**

   - A: Zero
   - B: C / D^2
   - C: C / D
   - D: $(1 / 4\pi\varepsilon_0)\ C / D^2$

8. **The force between two charges is 8N. If a medium of relative permitvity 4 is placed between the two charges, the force is reduced to?**

- A: 1 N
- B: 2 N
- C: 4 N
- D: Zero.

9. **Mathematically Guass's law can be expressed as?**

- A: $\Phi_e = \int E.dA$
- B: $\Phi_e = E.A$
- C: $\Phi_e = EAcos\theta$
- D: All of the above.

10. **The ratio of C_{vac} and C_{med} is equal to?**

- A: ε_0
- B: $1 / \varepsilon_0$
- C: ε_r
- D: $1 / \varepsilon_r$

11. **Which of the following is not a vector quantity?**

- A: Electric field intensity.
- B: Electric force
- C: Electric flux.
- D: All of the above are vector quantities.

12. **If two capacitors of value 10 mili F and 100 mili F are connected in parallel. Total capacitance is?**

- A: 9 mili F
- B: 10 mili F
- C: 100 mili F
- D: 110 mili F

13. **The ratio of the force between two small spheres (A) in air : (B) in a medium of dielectric constant K is? (The spheres have constant charge.)**

- A: 1 : K
- B: K : 1
- C: $1 : K^2$
- D: $K^2 : 1$

14. **An electric field can deflect?**

- A: X rays
- B: Neutrons.
- C: Gamma rays
- D: Alpha rays.

15. If charge on the particle is increased four times, the electric field?

- A: Increase by two times.
- B: Decrease by two times.
- C: Increase by four times.
- D: Remains same.

16. A particle of charge 2e falls through a potential difference of 6 V. Calculate the energy acquired by it?

- A: 2 eV
- B: 3 eV
- C: 6 eV
- D: 12 eV

17. There are two charges 1 uc and 6 uc are place in similar electric field at same distance from the source. The ratio of forces acting on them will be?

- A: 1 : 1
- B: 1 : 36
- C: 1 : 6
- D: 6 : 1

18. When capacitors are connected in parallel the net capacitance will?

- A: Decrease
- B: Increase
- C: Remain same
- D: Become zero.

19. The displacement of a charge Q in the electric field $\vec{E} = e_1 \hat{i} + e_2 \hat{j} + e_3 \hat{k}$ is $\vec{r} = a \hat{i} + b \hat{j}$. The work done is:

- A: $w = ae_1 + be_2$
- B: $w = (ae_1 + be_2)^{0.5}$
- C: $w = ae_1 + be_2 + e_3$
- D: $w = ae_1 + be_2 * (a+b)$

20. The Coulomb's force between two charges q_1 and q_2 separated by distance 'r' is F. If the separation between two charges is doubled keeping charges constant, then Coulomb's force becomes?

- A: 2F
- B: F/2
- C: 4F
- D: F/4

TEST-3

1. **Relative permitivity of three materials is given below. Which one would have highest electrostatic force for charged particles in that medium, keeping all other factors constact?**

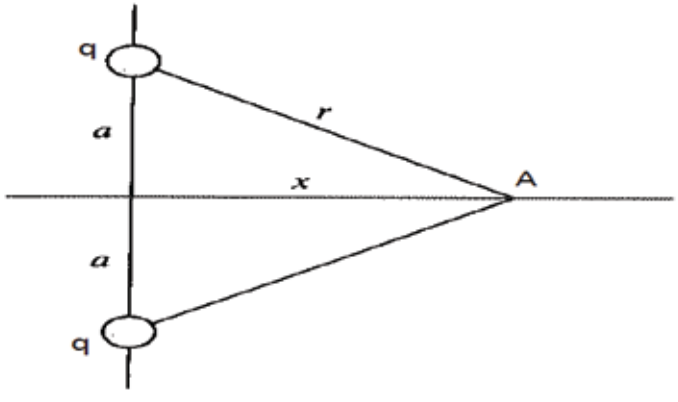
   Mica = 4
   Glass = 10

   - A: Germanium
   - B: Glass
   - C: Mica
   - D: All would have same value of electrostatic force.

2. **If three charges 2q, - q and - q are located at the vertices of an equilateral triangle then at the circumcentre of the triangle?**

   - A: The electric field is zero but the electric potential is non zero.
   - B: The electric potential is zero and the electric field is infinity
   - C: Both the electric field and the electric potential are zero
   - D: The electric field is non zero but electric potential is zero

3. **Find electric potential at point A due to two positive charges q seperated by distance a as shown in the figure?**



   - A: Zero.
   - B: $(1 / 4\pi\varepsilon_0) * q/ (a^2 + x^2)^{-2}$
   - C: $2 * (1 / 4\pi\varepsilon_0) * q/ (a^2 + x^2)^{1/2}$
   - D: $(1 / 4\pi\varepsilon_0) * q/ (a^2 + x^2)$

4. **How many electrons are there in 1 columb of charge?**

   - A: Zero.
   - B: 3.1×10^{19}
   - C: 1.9×10^{19}
   - D: 6.2×10^{18}

5. **If the distance between a point charge and an infinitely large charged plate is increased by a factor of 2, the new force on the point charge will?**

   - A: Increase by a factor of 2.
   - B: Decrease by a factor of 2.
   - C: Decrease by a factor of 4.
   - D: Remain same.

6. The potential at a point x (measured in μm) due to some charges situated on the x'-axis is given by $V(x) = 20/(x^2 - 4)$ volts. The electric field E at x = 4 μm is given by

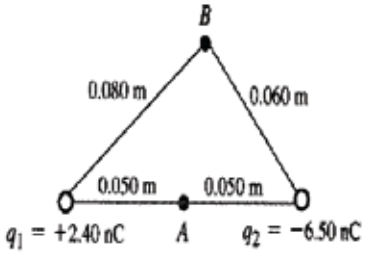
- A: 10 / 9 along -ve x direction
- B: 10 / 9 along +ve x direction
- C: 5 / 3 along +ve x direction
- D: 5 / 3 along -ve x direction

7. **The electric potential at a point of distance 1 m from 2 uc charge is?**

- A: $1.8 * 10^5$ V
- B: $1.8 * 10^4$ V
- C: $3.6 * 10^8$ V
- D: $3.6 * 10^6$ V

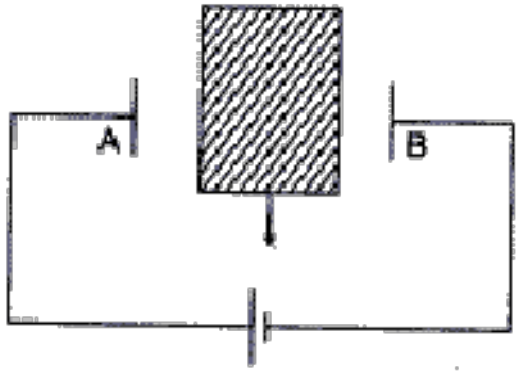
8. The locations of the charges and points *A* and *B* are sketched in Figure

Find Potential at Point A?



- A: -328 V
- B: - 737 V
- C: -839 V
- D: - 920 V

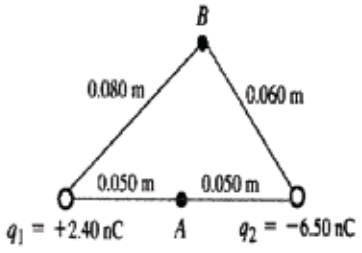
9. **For the figure below, an insulator plate is slowly placed between the plates of a capacitor and then removed. The current?**



- A: first flows from A to B, and then from B to A
- B: first flows from B to A, and from A to B
- C: always flows from B to A
- D: always flows from A to B

10. The locations of the charges and points *A* and *B* are sketched in Figure

Find Potential at Point B?

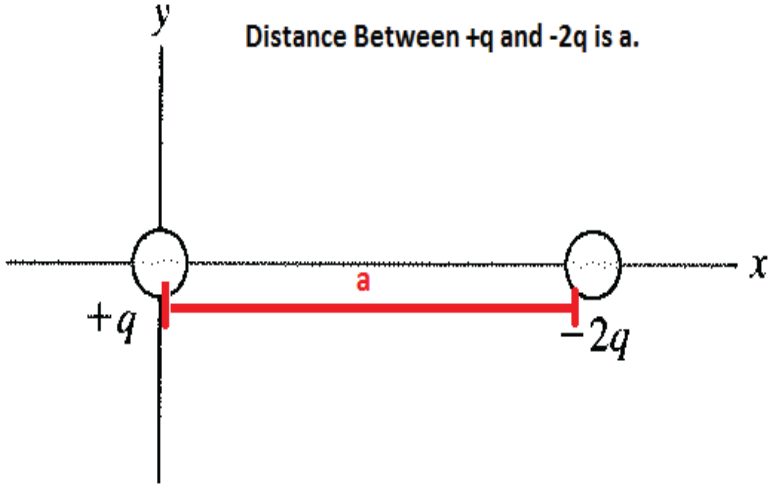


- A: - 704 V
- B: - 737 V
- C: - 841 V
- D: + 365 V

11. Two positive charges of charge q columb are separated by distance d. What is the absolute potential at miday between them?

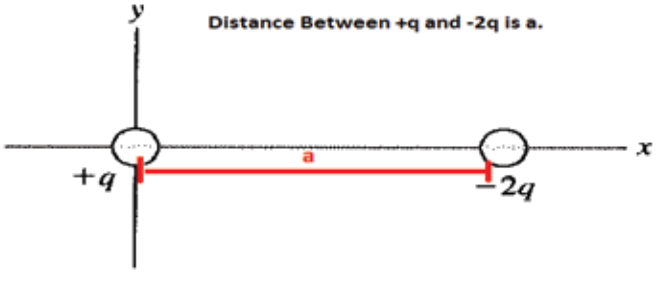
- A: $(1 / 4\pi\varepsilon_0) * q/d$
- B: $(1 / 4\pi\varepsilon_0) * 2q/d$
- C: $(1 / 4\pi\varepsilon_0) * 3q/d$
- D: $(1 / 4\pi\varepsilon_0) * 4q/d$

12. Find the function of electric potential at point x < 0 for the figure given below. k is constant.



- A: kq (x+a) / x(x-a)
- B: kq (x+a) / x^2
- C: kq (x+a) / x
- D: kq (x+a) / (x-a)

13. What is the funtion of potential difference for x > a for the figure below, k is constant.



- A: Zero
- B: -kq*x / x(x-a)
- C: -kq (x+a) / x(x-a)
- D: -kq (x+a) / (x-a)

14. A capacitor has capacitance 2.5 * 10^{-8} F. If V = 450 how many electrons are passed in charging the capacitor?

- A: 3 * 10^{14}
- B: 4 * 10^{11}
- C: 7 * 10^{13}
- D: None of the above.

15. Find the work done in moving a charged particle of 3 micro columb from infinity to a distance of 0.04m to another charged particle of 5 micro columb?

- A: 1.5 J
- B: 2.6 J
- C: 3.4 J
- D: 4.8 J

16. When two capacitors of same capacitance C are connected in parallel and then in series, the capacitance in these two cases are in ratio of?

- A: 1 : 4
- B: 4 : 1
- C: 1 : 2
- D: 2 : 1

17. A parallel plate capacitor is charged and the charging battery is then disconnected. If the plates of the capacitor are moved farther apart by means of insulating handles?

- A: the charge on the capacitor increases.
- B: the voltage across the plates decreases.
- C: the capacitance increases
- D: the electrostatic energy stored in the capacitor increases.

18. Two identical capacitors each of capacitance 5 μF are charged to potentials 2 kV and 1 kV respectively. Their -ve ends are connected together. When the +ve ends are also connected together, the loss of energy of the system is?

- A: Zero
- B: 0.5 J
- C: 1.25 J
- D: 5 J

19. An alpha particle has twice the charge of a proton. Two protons separated by a distance 'd' exert a force 'F' on each other. What must be the separation between the alpha particles so that they also exert a force 'F' on each other?

- A: 2d
- B: d/2
- C: $\sqrt{2}$ / d
- D: d / $\sqrt{2}$

20. The inward and outward electric flux from a closed surface are 8 × 10^3 and 4 × 10^3 units respectively. Then the net charge inside the closed surface is ?

- A: -8 * 10^3 ε_0
- B: 8 * 10^3 ε_0
- C: 4 * 10^3 ε_0
- D: -4 * 10^3 ε_0

TEST-4

1. **S.I unit of permittivity of free space is?**

   - A: $c^2 / N.m^2$
   - B: F / m
   - C: $N.m^2 / c^2$
   - D: Both A and B.

2. **A Capacitor of 2μF is connected with a battery of 12 Volts, the charge stored in the capacitor is?**

   - A: 2 μC
   - B: 6 μC
   - C: 12 μC
   - D: 24 μC

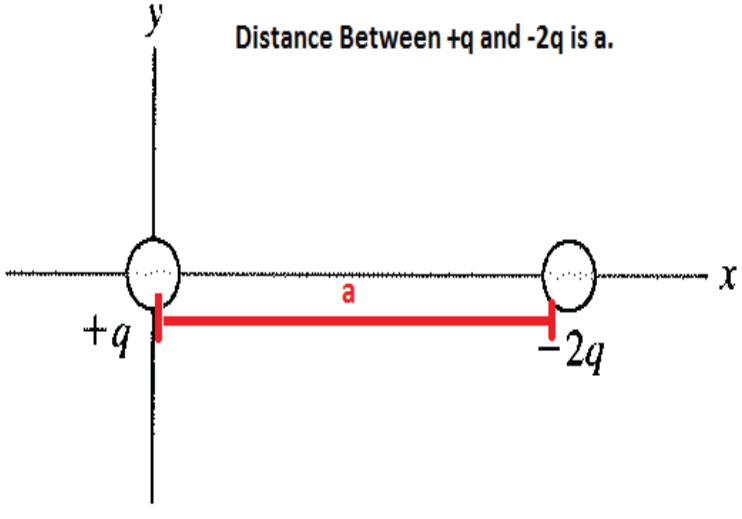
3. **Which of the following statement is true regarding three capacitors each of capacitance C?**

   - A: Total capacitance when connected in parallel is equal to when connected in series.
   - B: Total capacitance when connected in parallel is smaller than when connected in series.
   - C: Total capacitance when connected in parallel is greater than when connected in series.
   - D: Total capacitance when connected in series is zero.

4. **Two charges experience a force of 10 N, when the medium is Air. If the medium is changed to the one whose permittivity is '2' then the force will be?**

   - A: 2 N
   - B: 3 N
   - C: 5 N
   - D: 10 N

5. **For the figure below, what is the function of potential difference for point x such that 0 < x < a. k is constant.**

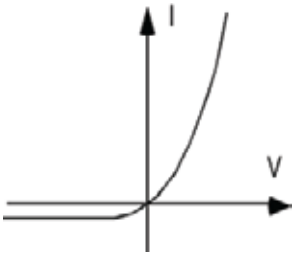


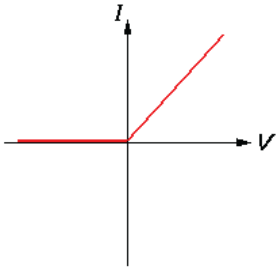
   - A: kq (3x-a) / (x-a)
   - B: kq (3x-a) / x(x-a)
   - C: kq (x-a) / x(x-a)
   - D: kq (3x) / (x-a)

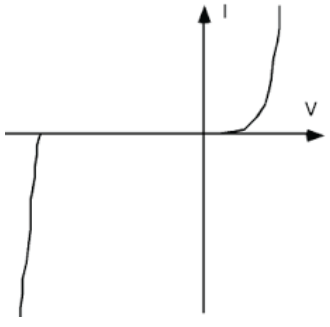
6. 1 eV = ?

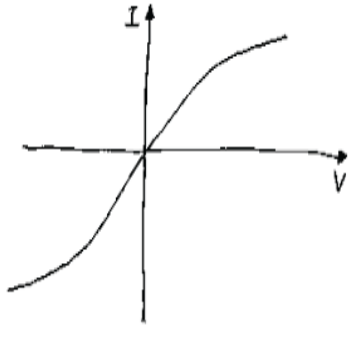
- A: $1.0 * 10^{-19}$ J
- B: $1.6 * 10^{-19}$ J
- C: $3.8 * 10^{-19}$ J
- D: $10 * 10^{-19}$ J

7. Which of the following is the I-V curve of a junction diode?

- A: 

- B: 

- C: 

- D: 

8. The work done in moving a charge along an equipotential surface is?

- A: Depends on the path.
- B: Greater than zero.
- C: Zero.
- D: Negative.

9. If two capacitors of value C1 and C2 are attaching in parallel their total capacitance is?

- A: C1 + C2
- B: C1C2 / (C1 + C2)
- C: C1 * C2
- D: (C1 + C2) / C1C2

10. In RC circuis, smaller values of time constanct RC lead to?

- A: No discharging.
- B: Rapid discharging.
- C: Slower discharging.
- D: Discharging is independend of the RC value.

11. Gauss's law can be applied to?

- A: Plane surface
- B: Curved surface
- C: Closed surface
- D: Any surface.

12. Electric field CAN NOT deflect?

i) alpha rays
ii) beta rays
iii) x rays.

- A: i only.
- B: ii only.
- C: iii only.
- D: ii and iii only.

13. Charge a and b of 1 C and 5 C are place in the electric field at distances 2 m and 5 m respectively. What is the ratio of force exerted on the charges a : b?

- A: 2 : 5
- B: 25 : 4
- C: 5 : 4
- D: 4 : 25

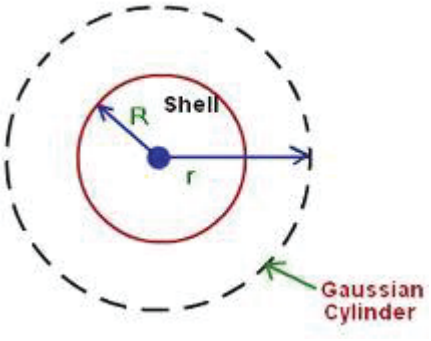
14. Which of the following is a correct relationshiop between work done, charge and voltage?

- A: $J = VC$
- B: $J = V/C$
- C: $JV = C$
- D: $J = VC^2$

15. Unit of electric flux is?

- A: N/C
- B: N^2m/C^2
- C: N^2/Cm
- D: Nm^2/C

16. If the inner shell of radius R is charged with a magnitude X columb. What is the electric flux in Nm^2/C through the Guassian surface given below?



- A: X
- B: X/ε_0
- C: $X\varepsilon_0$
- D: Zero

17. Electric intensity may be defined as?

- A: $-\varepsilon_0 / \Delta r$
- B: $\varepsilon_0 / \Delta r$
- C: $\Delta V/\Delta r$
- D: $-\Delta V/\Delta r$

18. Two point charges 3×10^{-6} C and 8×10^{-6} C repel each other by a force of 6×10^{-3} N. If each of them is given an additional charge - 6×10^{-6} C, the force between them will be?

- A: $2.4 * 10^{-3}$ N (attractive)
- B: $2.4 * 10^{-3}$ N (repulsive)
- C: $1.5 * 10^{-3}$ N (repulsive)
- D: $1.5 * 10^{-3}$ N (attractive)

19. Electric potential at any point is defined as?

- A: Work done in bringing unit negative charge from infinity to that point.
- B:Work done in bringing unit positive charge from a nearby point to that point keeping it in Equilibrium
- C: Work done in bringing unit positive charge from infinity to that point.
- D: Work done in bringing unit positive charge from infinity to that point keeping it in equilibrium.

20. If electric intensity is increased by three times the energy density of the capacitor?

- A: Remains same.
- B: Decrease by 3 times.
- C: Increase by 3 times.
- D: Increase by 9 times.

CURRENT ELECTRICITY

TEST-1

1. Thermo-couples convert which form of energy into electrical energy?

- A: Mechanical energy.
- B: Chemical energy.
- C: Heat energy.
- D: Light.

2. Resistances connected in series: Resistances connected in parallel - have across them?

- A: Same voltage: Same current.
- B: Same current: Same current
- C: Same voltage: Same voltage.
- D: Same current: Same voltage

3. Galvanometer is used to measure?

- A: Voltage
- B: Power
- C: Current
- D: Resistance.

4. Electric generators convert which form of energy into electrical energy?

- A: Mechanical energy.
- B: Chemical energy.
- C: Heat energy.
- D: None of the above.

5. Which of the follwing statement is true?

i. Galvanometer is connected in series.

ii. Voltmeter is connected in parallel.

- A: I only
- B: II only
- C: Both I and II
- D: Neither I nor II.

6. Speed of randomly moving free electrons in a metallic wire depends upon?

- A: Temperature
- B: Cross section area of the metal
- C: Length of metal.
- D: All of the above

7. Resistance of a copper wire is?

- A: Directly proportional to the length of the wire.
- B: Inversely proportional to the cross sectional area of the wire.
- C: Directly proportional to the amount of current in the wire.
- D: Both A & B.

8. Electric charge on an object is measured as 5 micro coulomb. How the value of this charge can be expressed in terms of base units?

- A: 5×10^{-6} ampere second
- B: 5×10^{6} ampere second
- C: 5×10^{-6} coulomb second
- D: 5×10^{6} coulomb second

9. Force on a current carrying conductor is given by :

- A: $ILsin_{\theta}$
- B: ILB
- C: IL
- D: $ILBsin_{\theta}$

10. SI unit of resistivity is?

- A: Ω
- B: Ω / m^2
- C: $\Omega \cdot m$
- D: $\Omega^{-1} \cdot m^{-1}$

11. Which of the following is the difference between the conventional and electric current?

- A: Magnitude
- B: Speed of electric flow
- C: Direction of electric flow
- D: None of the above.

12. As per Ohm's law current *"I"* flowing through a conductor is directly proportional to?

- A: V
- B: Length of conductor
- C: Cross sectional area of conductor.
- D: All of the above.

13. Two resistance of value R and 3R in series are connected to a voltage source V. Voltage drop across the 3R resistance is?

- A: Same as R
- B: Twice to that across R
- C: Three times to that across R
- D: One third to that across R.

14. Kirchhoff's second law is based on law of conservation of?

- A: Charge
- B: Energy
- C: Momentum
- D: Mass

15. Two resistance of value R and 3R in parallel are connected to a voltage source V. Voltage drop across the 3R resistance is?

- A: Same as that across R
- B: Three times to that across R
- C: Nine times to that across R
- D: One third to that across R.

16. Electric current produces which of the following phenomena in the surrounding space?

- A: Increase in heat
- B: Change in chemical nature.
- C: Mangetic field.
- D: None of the above.

17. Which of the following statement is true?

i. Ideal voltmeter has zero resistance.

ii. Ideal galvanometer has infinite resistance.

- A: I only
- B: II only
- C: Both I and II
- D: Neither I nor II.

18. If ΔQ is the charge passing through any cross section of a conductor in time Δt. Then?

- A: $I = \Delta Q * \Delta t$
- B: $I = \Delta Q * \Delta t *$ Area of cross section.
- C: $I = \Delta Q / \Delta t$
- D: $I = \Delta Q / (\Delta t *$ Area of cross section)

19. Electric current can result in which of the following?

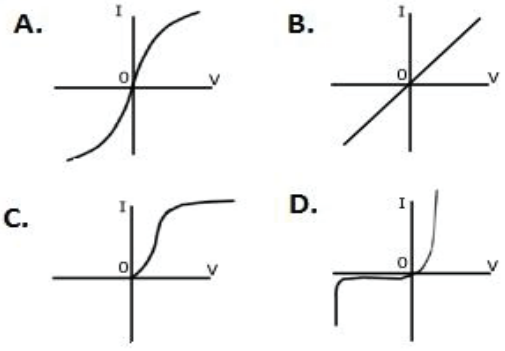
- A: Increase in heat.
- B: Magnetic effect.
- C: Chemical effect.
- D: All of the above.

20. Solar cells convert which form of energy into the electrical energy?

- A: Mechanical energy.
- B: Heat energy.
- C: Chemical energy.
- D: Sunlight energy.

TEST-2

1. Which of the following graphs shows the I-V relationship for non-ohmic conductors?



- A: A & D
- B: Only C
- C: Only A
- D: A, C & D.

2. For resistors, Silver and Gold band indicate the tolerance of ?

- A: +/- 20 and 10 percent respectively.
- B: +/- 5 and 10 percent respectively.
- C: +/- 10 and 5 percent respectively.
- D: +/- 10 and 20 percent respectively.

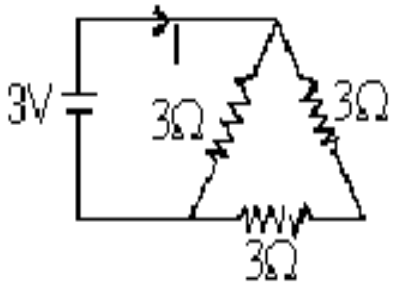
3. 10 V potential differences is applied across the plates of 1 micro-F capacitor. What is the energy stored in capacitor?

- A: 0.05 mJ
- B: 0.5 mJ
- C: 5 mJ
- D: 50 mJ

4. If D is the drift velocity of electrons and F is the velocity of free electrons at room temperature due to thermal motion. Which of the following is correct?

- A: D = F
- B: D > F
- C: D < F
- D: None of the above.

5. A 3V battery with negligible internal resistance is connected in a circuit as shown in the figure. The current I, in the circuit will be?



- A: 1 A
- B: 1.5 A
- C: 2 A
- D: 1/3 A

6. **One kilowatt hour of electrical energy is the same as?**

- A: $36 * 10^5$ Watts
- B: $36 * 10^5$ ergs
- C: $36 * 10^5$ BTU
- D: $36 * 10^5$ Joules.

7. **Two resistances of 1 ohm and 2 ohm are connected in series to a 6 V source. What is the power cosumed in the 2 ohm resistor?**

- A: 18 W
- B: 8 W
- C: 2 W
- D: 36 W

8. **For N resistances each of resistance R attached in series, the total resistance is equal to?**

- A: NR
- B: R / N
- C: N / R
- D: R

9. **A metallic wire has a resistance of 10 Ω at 0^0 C and 20 Ω at 50^0 C. The temperature coefficient of resistivity for the metal is?**

- A: 0.02 K^{-1}
- B: 0.04 K^{-1}
- C: 0.06 K^{-1}
- D: 0.08 K^{-1}

10. **A potentiometer has a wire of length 1 m. The specific resistance of the material of the potentiometer wire is 10^{-7} ohm-metre, and the current passing through it is 0.1 ampere, cross-section of the wire is $10^{-6}m^2$. The resistance of the wire is?**

- A: 10^{-1} Ω
- B: 10^{-2} Ω
- C: 10^{-3} Ω
- D: 10^{-4} Ω

11. **What is the charge stored on a 5 μF capacitor charged to the potential difference of 12 V?**

- A: 60 μC
- B: 2.4 C
- C: 2.4 μC
- D: 60 C

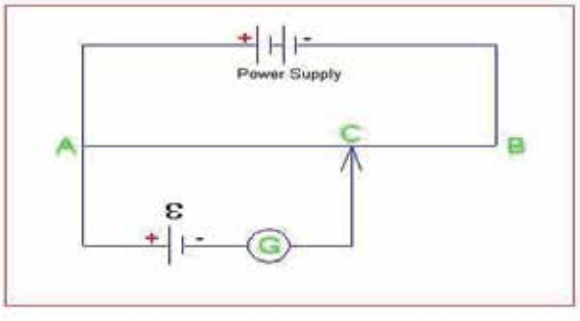
12. The charge on an electron is known to be 1.6 x 10^{-19} coulomb. In a circuit the current flowing is 1 A. How many electrons will be flowing through the circuit in a second?

- A: 1.6 x 10^{-19}
- B: 1.6 x 10^{19}
- C: 0.625 * 10^{12}
- D: 0.625 * 10^{19}

13. If 2.0 * 10^{7} electrons pass through a conductor in 1 micro second. What is the current flowing through the conductor? Charge of electron is 1.6 * 10^{-19} C.

- A: 1.6 * 10^{-6} A
- B: 1.6 * 10^{-9} A
- C: 3.2 * 10^{-6} A
- D: 3.2 * 10^{-9} A

14. **In order to measure the resistance of an unknown emf source the reading of galvanometer in the given arrangement must be equal to? Assume that length AB is a resistor of uniform cross sectional area.**



.

- A: Maximum
- B: 10
- C: Negative
- D: Zero.

15. Potentiometer is one of the most accurate methods to measure?

- A: Resistance
- B: Current
- C: Conductance
- D: Voltage

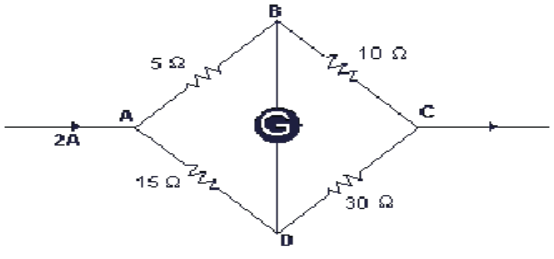
16. A 24 V battery is connected to a 4 ohm resistor, causing a current of 5 amperes. What is the internal resistance of the battery?

- A: 0 Ω
- B: 0.8 Ω
- C: 0.4 Ω
- D: 1.6 Ω

17. An electric rod of 2000 watts rating boils a certain quantity of water in 10 minutes, the heat which is generated for boiling this water is?

- A: $8x10^4$ j
- B: $12x10^5$ j
- C: $19x10^5$ j
- D: $23x10^5$ j

18. For the Wheatstone bridge, shown in the figure, total current is 2A. Then current through BD will be?



- A: 0.5 A
- B: 1.0 A
- C: 0 A
- D: 0.75 A

19. Fractional change in resistance per kelvin is known as?

- A: Resistivity
- B: Conductivity.
- C: Fractional resistance.
- D: Temperature coefficient of resistance.

20. If R_1 and R_2 are the resistances of the filaments of 200 w and 100 w electric bulbs operating at 220 v, what is R_1 / R_2?

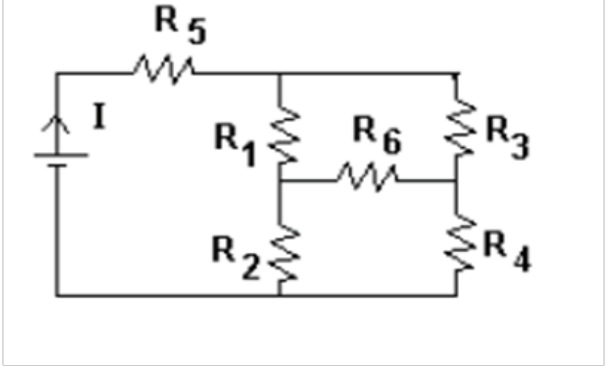
- A: 0.5
- B: 1
- C: 2
- D: 4

TEST-3

1. **If a resister of resistance R is cut into three pieces, then equivalent of resistance of parallel combination will be :**

   - A: 0/R
   - B: 3/R
   - C: R/9
   - D: R/3

2. **In the given circuit, it is observed that the current I is independent of the value of the resistance R_6. Then, the resistance values must satisfy?**

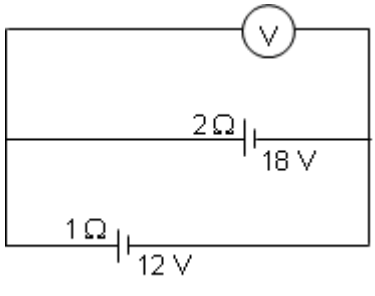


   - A: $R_1R_2R_5 = R_3R_4R_6$
   - B: $1/R_1 + 1/R_6 = 1 / (R_1 + R_2)$
   - C: $R_1R_4 = R_2R_3$
   - D: $R_1R_3 = R_2R_4 = R_5R_6$

3. **Two cells of same emf E, but different internal resistances r_1 and r_2 are connected in series to an external resistance R. The value of R for which the potential difference across the first cell is zero, is given by?**

   - A: $R = r_1 - r_2$
   - B: $R = r_1 + r_2$
   - C: $R = r_1 * r_2$
   - D: $R = r_1 / r_2$

4. **Two batteries, one of emf 18 V and internal resistance 2 Ω; and the other of emf 12 V and internal resistance 1 Ω, are connected as shown. The voltmeter V will record a reading of?**



   - A: 30 V
   - B: 6 V
   - C: 14 V
   - D: 18 V

5. **For two resistance wires joined in parallel, the resultant resistance is 6/5 ohm. When one of the resistance wires breaks, the effective resistance becomes 2 ohm. The resistance of the broken wire is?**

- A: 3/5 Ω
- B: 2 Ω
- C: 6/5 Ω
- D: 3 Ω

6. **What is the value of the resistance with color code Green, Black and Red from left to right?**

- A: 2600 Ohms
- B: 5000 Ohms
- C: 5300 Ohms
- D: 6500 Ohms

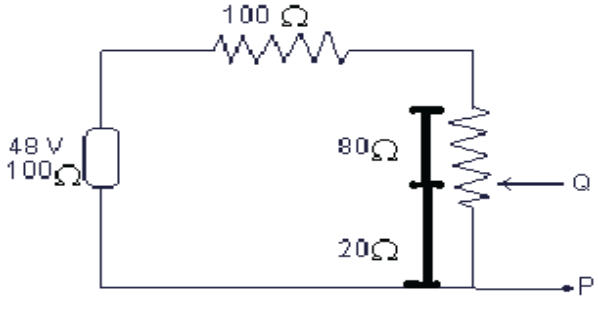
7. **In Pakistan, electricity supplied for domestic use is 220 V, and 110 V in USA. If the resistance of a 60 W bulb for use in Pakistan is R, the resistance of a 60 W bulb for use in USA will be?**

- A: R
- B: 2R
- C: R/4
- D: R/2

8. **If the current flowing in a coil of resistance 90 Ω is to be reduced by 90%, what value of resistance that should be connected in parallel with it is?**

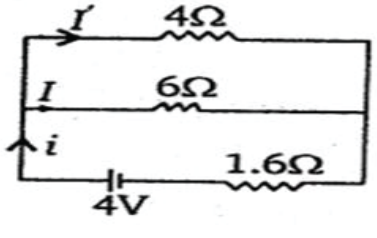
- A: 9 Ω
- B: 90 Ω
- C: 10 Ω
- D: 100 Ω

9. **In the circuit, the potential difference across PQ is?**



- A: 9.6 V
- B: 7.6 V
- C: 4.8 V
- D: 3.2 V

10. **Which of the following statement is true about the circuit given below?**



- A: i = I = I"
- B: i > I" > I
- C: i > I > I"
- D: i = I - I"

11. An electric bulb is rated 220 volt – 100 watt. The power consumed by it when operated on 110 volt will be

- A: 75 W
- B: 40 W
- C: 25 W
- D: 50 W

12. The resistance of a piece of wire is 12 ohms. It is bent in the form of an equilateral triangle. What is the eqiuivalent resistance between any two corners of triangle ?

- A: 1.3 ohm
- B: 2 ohm
- C: 4 ohm
- D: 2.7 ohm

13. For N resistors each of resistance R attached in parallel. Total resistance is?

- A: NR
- B: N / R
- C: R / N
- D: None of the above.

14. The resistance of wire of uniform diameter d and length l is R. The resistance of another wire of the same material, but diameter 2d and length 4l will be?

- A: 2R
- B: R
- C: R/4
- D: R/2

15. An aluminium rod and a copper rod are taken, such that their lengths are the same and their resistances are also the same. The specific resistance of copper is half that of aluminium, but its density is three times that of aluminium. The ratio of the mass of aluminium rod, and that of copper rod will be?

- A: 1/6
- B: 2/3
- C: 1/3
- D: 1/8

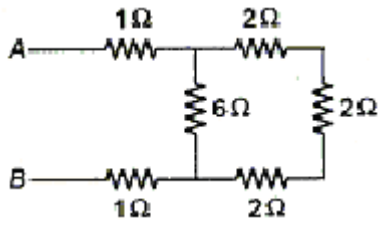
16. A potentiometer has a wire of length 1 m. The specific resistance of the material of the potentiometer wire is 10^{-7} ohm-metre, and the current passing through it is 0.1 ampere, cross-section of the wire is $10^{-6}m^2$. The potential drop per unit length of wire is?

- A: 10^{-8} V / m
- B: 10^{-6} V / m
- C: 10^{-4} V / m
- D: 10^{-2} V / m

17. Which of the following statement is true about the total resistance (R) of two resistors with resistance R1 and R2 attached in parallel?

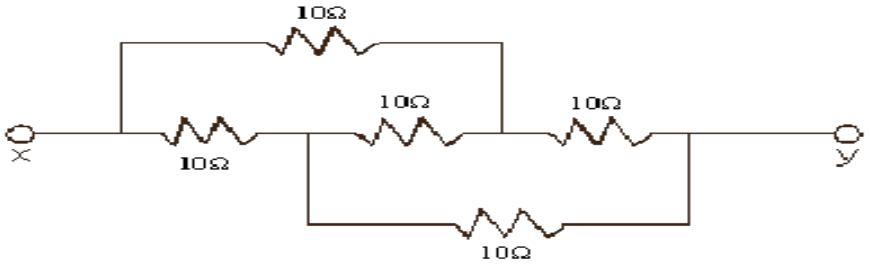
- A: R < R2
- B: R < R1
- C: R = R1 + R2
- D: R < least of R1 and R2.

18. In the figure, what is the equivalent resistance between A and B?



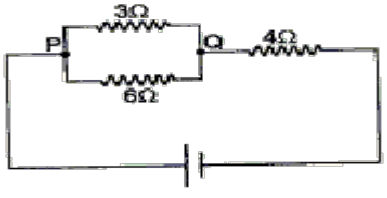
- A: 3 Ω
- B: 4 Ω
- C: 5 Ω
- D: 6 Ω

19. The equivalent resistance between x, and y in the circuit shown is?



- A: 10 Ω
- B: 20 Ω
- C: 50 Ω
- D: 5 Ω

20. If the current through 3 Ω resisters is 0.8 A, the potential drop through 4 Ω resister is?



- A: 1.5 V
- B: 2.6 V
- C: 4.8 V
- D: 9.8 V

TEST-4

1. **If resistivity of a conductor is 4 Ωm. Its conductivity is?**

   - A: 4 $(\Omega m)^{-1}$
   - B: 0.125 $(\Omega m)^{-1}$
   - C: 0.25 $(\Omega m)^{-1}$
   - D: Not enough information given to answer the question.

2. **In a Wheatstone's, bridge all the four arms have equal resistance R. If the resistance of the galvanometer arm is also R, the equivalent resistance of the combination as seen by the battery is?**

   - A: R/2
   - B: R/4
   - C: 2R
   - D: R

3. **An ideal galvanometer has?**

   - A: Infinite resistance.
   - B: Zero Resistance.
   - C: Resistance equal to that of voltage source.
   - D: None of the above.

4. **Which of the following is not the same as watt?**

   - A: Joule / s
   - B: A / V
   - C: A^2 * Ohm
   - D: A. V

5. **Two 220 V, 100 W bulbs are connected first in series and then in parallel. Each time the combination is connected to a 220 V AC supply line. The power drawn by the combination in each case respectively will be?**

   - A: 200 W, 150 W
   - B: 50 W, 200 W
   - C: 200 W, 50 W
   - D: 100 W, 50 W

6. **Units of electromotive force are?**

   - A: Newtons
   - B: Joule / Coulomb
   - C: Ohms
   - D: None of the above.

7. **Increase in the temperature for a substance results in?**

   - A: Increase of resistance.
   - B: Decrease of resistance.
   - C: Increase or decrease of resistance.
   - D: None of the above.

8. **Two electric bulbs rated P_1 watt V volts, and P_2 watt V volts are connected in parallel and applied across V volts. The total power will be?**

- A: $P_1 + P_2$
- B: $(P_1P_2)^{0.5}$
- C: $(P_1 + P_2) / P_1P_2$
- D: $P_1P_2 / (P_1 + P_2)$

9. **Which of the following is a heat sensitive resistor?**

- A: Potential Divider.
- B: Variable Resistor.
- C: Thermistor
- D: Rheostat.

10. **A charge of 90 C passes through a wire in 1 hour. The current in the wire is?**

- A: 90 A
- B: 1.5 A
- C: 25 mA
- D: 2.5 mA

11. **Resistance of 1000 ohms with a tolerance of 20 percent may have the actual value in the range of?**

- A: 980 and 1020
- B: 800 - 1200
- C: 1000 - 1200
- D: 800 - 1000

12. **If 2A current passes through a resistor when connected to a certain battery. If the resistance is replaced by double resistance then current will become:**

- A: 2A
- B: 4A
- C: 6A
- D: 1A

13. **A good conductor should have?**

- A: Low resistivity.
- B: High conductance.
- C: Large number of valence electrons.
- D: All of the above.

14. **Resistivity of a wire depends on?**

- A: Length
- B: Material
- C: Cross sectional area
- D: All of the above.

15. What will be the reading of Ammeter if connected in series with two volatge sources of 6V and 9V and a resistance of 3ohms?

- A: 1
- B: 5
- C: 10
- D: 15

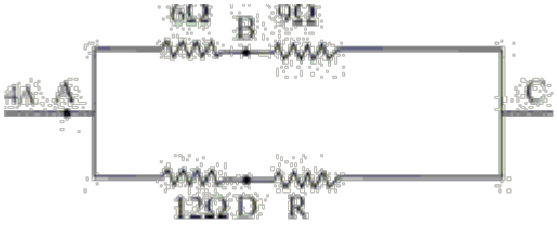
16. When a metallic wire is attached to a battery?

- A: The free electrons start moving randomly.
- B: Valence electrons attain drift velocity in the direction of the voltage source.
- C: Valence electrons start moving towards the direction of the voltage source.
- D: Boith B and C.

17. Over a considerable range of temperature above and below 0^0 C. The change is resistance of a metallic conductor with respect to temperature is?

- A: Linear
- B: Non-Linear
- C: Exponential.
- D: None of the above.

18. If $V_B - V_D = 0$ in the given circuit, then, what is the value of R?



- A: 3 Ω
- B: 4.5 Ω
- C: 18 Ω
- D: 28 Ω

19. Two electric bulbs rated P_1 watt V volts, and P_2 watt V volts are connected in series and applied across V volts. The total power will be

- A: $P_1 + P_2$
- B: P_1 / P_2
- C: $(P_1 + P_2) / P_1P_2$
- D: $P_1P_2 / (P_1 + P_2)$

20. Two batteries are hooked together in an electric circuit. Which of the following statements is/are true?

l. Maximum voltage is obtained when the batteries are wired in parallel.
II. Maximum voltage is obtained when the batteries are wired in series.
III. Maximum current capacity is obtained when the batteries are wired in parallel.

- A: I only
- B: II only
- C: I and III only.
- D: II and III only.

ELECTROMAGNETISM

TEST-1

1. Magnetic flux passing normally through a unit area is called?

- A: Magnetic induction
- B: Magnetic flux density
- C: Magnetic flux
- D: Both A & B.

2. Which of the following is the proper way to study sinusoidal waveform of voltage?

- A: Voltage is connected to X input and the time base generator is switched off.
- B: Voltage is connected to Y input and the time base generator is switched on.
- C: Voltage is connected to Y input and the time base generator is switched off.
- D: Voltage is connected to X input and the time base generator is switched on.

3. The magnetic induction of solenoid is?

- A: $\mu_0 nI$
- B: $\mu_0 nL$
- C: $\mu_0 n$
- D: None of the above.

4. Magnetic field strength is measured in :

- A: Wb/m^2
- B: Wb/m
- C: Wbm^2
- D: Wb

5. The poles of a magnet are smilar to?

- A: Direction as Geo poles
- B: Opposite to Geo poles
- C: Perpendicular to Geo Poles
- D: None

6. Henry is the unit of?

- A: Electric flux
- B: Magnetic Flux
- C: Inductance
- D: Mangetic field intensity.

7. The waveform of sinusoidal voltage, its frequency and phase can be found by?

- A: CRO
- B: Diode
- C: Transistor
- D: Radio

8. The S.I unit of Magnetic Permiability is ?

- A: wb / m^2
- B: web.A / m
- C: wb.m / A
- D: Wb / (A.m)

9. The relation between Tesla (T) and Gauss (G) is given as ?

- A: $1T = 10^4G$
- B: $1T = 10^6G$
- C: $1T = 10^{-4}G$
- D: $1T = 10^{-6}G$

10. Shunt resistor is also called?

- A: By pass resistor
- B: Specific resistor
- C: Reactance.
- D: Ohm resistance.

11. The S. I unit of magnetic permiability is?

- A: TmA^{-2}
- B: TmA^{-1}
- C: Wbm^{-1}
- D: $WbAm^{-1}$

12. One weber is equal to?

- A: $N.A^2/A$
- B: $N.m^2/A$
- C: N.A/m
- D: N.m/A

13. A Moving Charge is surrounded by?

- A: 2 fields
- B: 3 fields
- C: 4 fields
- D: None

14. The origin of Magnetism is?

- A: Iron
- B: Steel
- C: Movement of electron
- D: None of These

15. A current carrying conductor carries current away from you. In this case the direction of magnetic field with respect to you is?

- A: Away from you
- B: Towards you
- C: Clock wise
- D: Anti clockwise

16. Force experienced by a moving charge particle with velocity s and charge e in a magnetic field B is?

- A: F = e / (s x B)
- B: F = e / (s . B)
- C: F = e (s . B)
- D: F = e (s x B)

17. CRO is same as?

- A: Radio
- B: TV Picture tube
- C: Transistor
- D: X-ray machine

18. Ampere's law is applicable to?

- A: Circular path
- B: Rectangular path
- C: To any path
- D: Eleptical path.

19. $F = F_e + F_m$ is ?

- A: Electric force
- B: Magnetic force
- C: Lorentz force
- D: None of the above.

20. The e/m value of electron is?

- A: 1.7588×10^{11}
- B: 1.75599×10^{12}
- C: 1.7588×10^{9}
- D: 1.7559×10^{14}

TEST-2

1. Force acting on an electron (charge q) entering in the magnetic field of B wb/m^2 (along the direction of the field), with velocity v is?

- A: Zero
- B: qvB
- C: 2qvB
- D: -qvB

2. When a small resistance is connected in parallel to the galvanometer it is converted into?

- A: Ammeter
- B: Voltmeter
- C: AVO meter
- D: Ohm meter

3. The restoring couple in the moving coil galvanometer is due to?

- A: Current in the coil
- B: Magnetic field in the coil.
- C: Material of the coil.
- D: Twist produced in suspension wire.

4. The value of a very high resistor R_h connected in series with the galvanometer in order to convert it into voltmeter is given by?

- A: V / (Ig- Rg)
- B: $(V / I_g) - R_g$
- C: $(I_g / V) - R_g$
- D: $I / (V - R_g)$

5. Which of the following is true about the magnetric foce on a beam of electron perpendicular to the direction of the magnetic field?

- A: Force changes the speed of and direction of the electron beam.
- B: Force reduces the number of electrons in the beam.
- C: Magnitude of force is zero.
- D: Force only changes the direction of the electron beam.

6. If the angle between V and B is zero then magnetic force will be?

- A: Max
- B: Min
- C: Zero
- D: None

7. Which of the following is true about a current carrying insulated wire?

It has a surrounding magnetic field.

The magnetic field is circular

Magnetic field lasts as long as there is current in the wire.

- A: i and ii only.
- B: i and iii only.
- C: ii and iii only.
- D: i, ii and iii only.

8. The flux through an area of 1m2 in x -y plane in a magnetic field of 1 T directed along Z- axis will be?

- A: Zero
- B: 1 web
- C: 0.5 web
- D: None

9. If the number of turns of solenoid double but the current in the coil and radius of the coil remains same, then what will be the magnetic flux density produced by the coil?

- A: Magnetic flux density will be haved
- B: Magnetic flux density increases by different amount at different points
- C: Magnetic flux density remains unchanged
- D: Magnetic flux density will be doubled

10. Which of the following is a scalar quantity?

- A: Force
- B: Magnetic Induction.
- C: Magnetic Flux
- D: Both B and C.

11. The voltage that is applied across X-plates in CRO is provided by a circuit called:

- A: Time base generator
- B: Audio generator
- C: Signal generator
- D: Linear generator

12. A photon while passing through a magnetic field is deflected towards?

- A: Norht pole
- B: south Pole
- C: North or sound depending on their charge.
- D: None of the above.

13. A vertical solenoid has 200 turns in a length of 0.4m and carries a current of 3A in anticlockwise.The flux density in the middle in Tesla is about?

- A: $3\pi 10^{-4}$ wb/m^2
- B: $6\pi 10^{-4}$ wb/m^2
- C: $30\pi 10^{-4}$ wb/m^2
- D: $60\pi 10^{-4}$ wb/m^2

14. Which of the following is a hard magnet?

- A: Iron
- B: Nickel
- C: Steel
- D: Copper

15. In multi range Ammeter?

- A: Resistances of different values are connected in series with galvanometer
- B: Different Resistances are connected in parallel with galvanometer
- C: Some resistances are connected in parallel and some of them are connected in series
- D: None of the above.

16. Cathode ray oscilloscope consists of which of the following parts?

- A: Filament, cathode, grid and anode
- B: Cathode, anode, capacitor, screen
- C: Emitter, base, collector, resistor
- D: Resistor, capacitor, inductor

17. The brightness of the spot formed on the screen of CRO in controlled by the?

- A: Cathode
- B: Anode
- C: Y plates
- D: Grid

18. To convert a galvanometer into voltmeter we connect?

- A: A small resistance in parallel.
- B: A large resistance in parallel.
- C: A small resistance in series.
- D: A large resistance in series.

19. The output on CRO screen for the sweep voltage given below would be? Assume T is 1 s.

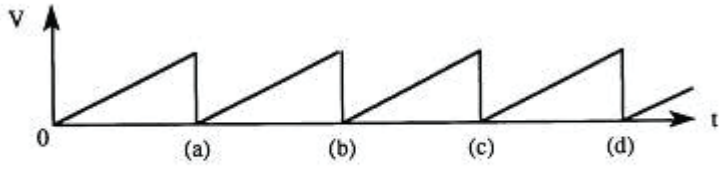


Figure. 2. Voltage difference V between horizontal plates as a function of time t.

- A: A straight line.
- B: A spot deflected linearly along the y-axis.
- C: A spot deflected linearly along the x-axis.
- D: Sinusoidal wave.

20. The potential difference across the shunt resistor R_s is ?

- A: $V = I_g R_g$
- B: $V = (I - I_g) R_s$
- C: $V = (I_g - I) R_s$
- D: Both A & B.

TEST-3

1. The material used in the fluorescent screen of CRO is?

- A: Magnesium
- B: Glass
- C: Phosphor
- D: Sodium

2. A galvanometer with R_g = 15 ohms gives full scale current I_g=20 mA. What is the shunt resistance to convert it into an ammeter of range 10.0 A?

- A: 0.03 ohms
- B: 0.05 ohms
- C: 0.07 ohms
- D: 0.09 ohms

3. An electron is travelling along the x-direction. It encounters a magnetic field in the y-direction. Its subsequent motion will be?

- A: Straight line along x direction.
- B: Circle in xz plane.
- C: Circle in yz plane.
- D: Circle in xy plane.

4. An electron (q = 1.6 x 10^{-19} C) is moving at right angle to the uniform magnetic field of 3.534 x 10^{-5} T. The time taken by the electron to complete a circular orbit is?

- A: 4 μs
- B: 3 μs
- C: 2 μs
- D: 1 μs

5. The diagram below shows?

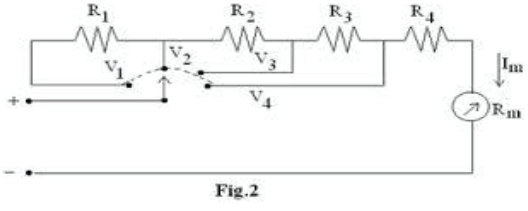
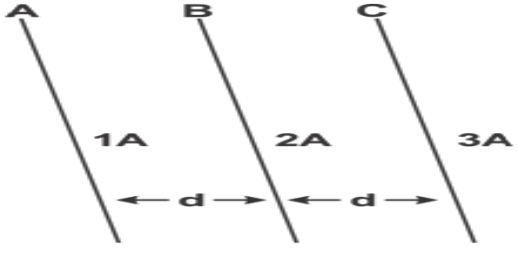


Fig.2

- A: Multi range voltmeter.
- B: Multi range ammeter
- C: Multi range ohm meter.
- D: None of the above.

6. Three long straight wires A, B and C are carrying currents as shown in the figure. Then, the resultant force on B is directed to?



- A: Outward from the paper.
- B: Into the paper.
- C: Towards C.
- D: Towards A.

7. A particle of charge - 16 x 10^{-18} C moving with velocity 10 ms^{-1} along the x-axis enters a region where a magnetic field of induction B is along the y-axis and an electric field of magnitude 10^4 V/m is along the negative z-axis. If the charged particle continues moving along the x-axis, the magnitude of B is?

- A: 10^3 wb/m^2
- B: 10^5 wb/m^2
- C: 10^{12} wb/m^2
- D: 10^{-3} wb/m^2

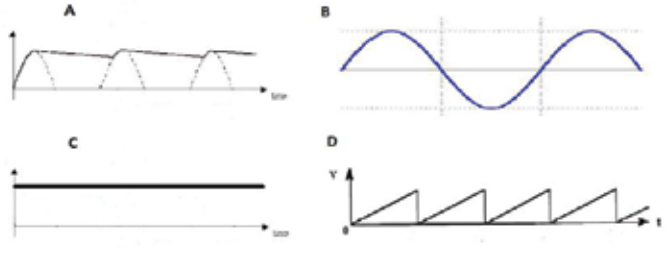
8. The strength of the magnetic field around a long straight wire carrying current, is?

- A: The same everywhere around the wire at any distance.
- B: Inversely proportional to the distance from the wire.
- C: Inversely proportional to the square of the distance from the wire.
- D: Directly proportional to the square of the distance from the wire.

9. How fast a proton should travel in a magnetic field of 2.5 * 10^{-3} T such that magnetic force on it equals its weight? Mass of proton is 1.7 * 10^{-27}

- A: 4 * 10^{-3} m/s
- B: 4 * 10^{-4} m/s
- C: 4 * 10^{-5} m/s
- D: 4 * 10^{-6} m/s

10. Wave form of sweep or time base generator of CRO is?



- A: A
- B: B
- C: C
- D: D

11. A solenoid is to be designed to give B= 8pi T and maximum current 10 A. What should be the turns per unit length for that solenoid?

- A: 2 * 10^4
- B: 2 * 10^6
- C: 4 * 10^4
- D: 4 * 10^6

12. A long solenoid has 200 turns per cm, and carries a current i. The magnetic field at its centre is 6.28 *10^{-2} Weber/m^2. Another long solenoid has 100 turns per cm, and it carries a current i/3. The value of the magnetic field at its centre is?

- A: 1.05 × 10^{-2} Weber/m^2
- B: 1.05 × 10^{-3} Weber/m^2
- C: 1.05 × 10^{-4} Weber/m^2
- D: 1.05 × 10^{-5} Weber/m^2

13. At the center of a circular coil of radius 5 cm carrying current, magnetic field due to earth is 0.5 x 10^{-5} W/m^2. What should be the current flowing through the coil, so that it annuls Earth's magnetic field?

- A: 40 A
- B: 4 A
- C: 0.4 A
- D: 0.2 A

14. Two similar coils are kept mutually perpendicular, such that their centers coincide at the centre. Find the ratio of the magnetic field due to one coil, and the resultant magnetic field through both coils, if the same current is passed?

- A: 1 : $\sqrt{2}$
- B: 1 : 2
- C: 2 : 1
- D: $\sqrt{3}$: 1

15. To increase the scale of galvanometer to twice of its initial value we need to connect a shunt ?

- A: Rs = Rg
- B: Rs< Rg
- C: Rs>Rg
- D: Rs = 0

16. If two current carrying conductors perpendicular to a magnetic field have similar current is the different direction then?

- A: They attract each other.
- B: They repel each other.
- C: They neither attract nor repel each other.
- D: They may attract or repel each other.

17. Magnetic field on the ground due to a 10 m high wire carrying 400 A current is?

- A: $16\pi * 10^{-7}$ T
- B: $8\pi * 10^{-6}$ T
- C: $8 * 10^{-6}$ T
- D: None of the above.

18. In an ammeter 10% of main current is passing through the galvanometer. If the resistance of the galvanometer is G, the shunt resistance, in ohms is?

- A: 9G
- B: G/9
- C: 90G
- D: None of the above.

19. What is the radius of orbit of an electron moving at $2 * 10^7$ m/s in a uniform magnetic field of 1.2 * 10^{-3} T is? Mass of electron is $9 * 10^{-31}$ kg.

- A: $9.5 * 10^{-2}$
- B: $7.8 * 10^{-2}$
- C: $8.4 * 10^{-3}$
- D: $6.9 * 10^{-3}$

20. If mangetic field is at angle 60^0 to the plane. Magnetic flux through the plane is?

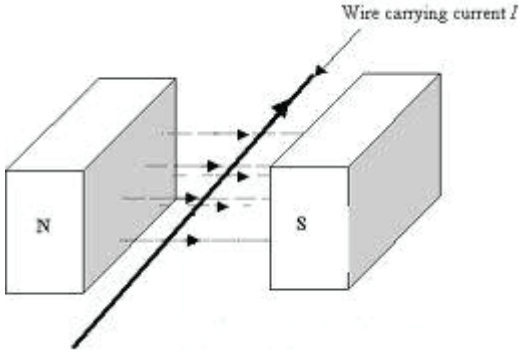
- A: Φ_b = BA
- B: Φ_b = BA cos 30
- C: Φ_b = BA cos 60
- D: Φ_b = BA cos 90

TEST-4

1. **A solenoid of length 500m is wounded into 100 turns. A current of 10A flows in it, the magnetic field intensity is ?**

- A: 20 μ_0
- B: 200 μ_0
- C: 2000 μ_0
- D: None of the above.

2. **What is the direction of force on the wire in the figure below?**



- A: Towards North Pole
- B: Towards South Pole
- C: Upwards
- D: Downwards

3. **In velocity sector method, the velocity of an electron is given by ?**

- A: $v = (2V / m)^{0.5}$
- B: $v = (3\ Ve / m)^{0.5}$
- C: $v = (2V / me)^{0.5}$
- D: $v = (2\ Ve / m)^{0.5}$

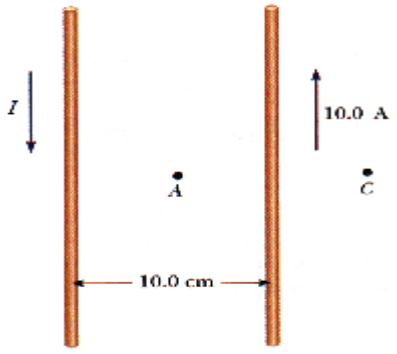
4. **1 weber = ____ ?**

- A: 10^6 Maxwell
- B: 10^8 Maxwell
- C: 10^{10} Maxwell
- D: 10^{12} Maxwell

5. **A soft iron cylinder is placed inside the galvanometer coil to?**

- A: Make magnetic field stronger near the coil.
- B: Make magnetic field radial near the coil.
- C: Increase torque.
- D: All of the above.

6. **Two straight parallel wires held vertically have equal but opposite currents as shown in figure:**



Which of the following effect will be observed?

- A: Magnetic field at A is stronger than that at C
- B: Magnetic field at A is weaker than that at C
- C: Magnetic field at A ,C is same.
- D: Magnetic field at A is may be stronger or weaker than C

7. If B = 40i + 8k Wb/m^2. How much flux passes through a 5 m^2 xy plane?

- A: 40 Wb
- B: 200 Wb
- C: 240 Wb
- D: 360 wb

8. AVO meter is used to measure?

- A: Current
- B: Voltage
- C: Resistance
- D: All of above

9. In the galvanometer the current is proportional to ?

- A: Magnetic field
- B: Electric field
- C: Angle of deflection of suspension wire.
- D: All of the above.

10. C.R.O has how many sets of deflecting plates?

- A: One
- B: Two
- C: Three
- D: Four

11. The force on the charge particle moving parallel to magnetic field is?

- A: Maximum
- B: Minimum
- C: Zero
- D: None

12. A current carrying loop, when placed in a magnetic field will experience?

- A: Electric flux
- B: Torque
- C: Magnetic flux
- D: Unidirectional Force

13. The dot product of magnetic field and area is equal to?

- A: Electric flux
- B: Magnetic flux
- C: Ampere law
- D: Magnetic induction.

14. An ideal voltmeter has?

- A: Small resistance
- B: Medium resistance
- C: High resistance
- D: Zero resistance.

15. What is the magnetic flux passing through a plane parallel to B?

- A: Zero
- B: Minimum
- C: Maximum.
- D: Cannot determine with the given information.

16. If α is the angle between a current carrying wire and magnetic field, force on the conductor is directly proportional to?

- A: α
- B: $\sin \alpha$
- C: $\cos \alpha$
- D: α^2

17. When charge particle enter perpendicular to uniform magnetic field, the path followed by it is?

- A: A helix
- B: A circle
- C: Straight line
- D: Eclipse

18. An electron moves at $2x\ 10^2$ m/sec perpendicular to magnetic field of 2T what is the magnetic of magnetic force?

- A: $1x\ 10^{-6}$ N
- B: 6.4×10^{-17} N
- C: 3.6×10^{-24} N
- D: 4×10^{6} N

19. The unit of permeability of free space is?

- A: T.m/A
- B: $T.m^2/A$
- C: $T.m/A^2$
- D: None

20. When a variable resistance and a cell is attached in series to a galvanometer. It is turned into?

- A: Ammeter
- B: Voltmeter
- C: Ohm meter
- D: AVO meter.

ELECTROMAGNETIC INDUCTION

TEST-1

1. The induced currents always produce expanding magnetic fields around their conductors in a direction that opposes the original magnetic field. This law is called?

- A: Lenz's law
- B: Fleming's law
- C: Ohm's law
- D: Kirchhoff's law

2. The back e.m.f exist in the?

- A: Generator
- B: Motor
- C: Transformer
- D: Diodes

3. The energy stored in the inductor is?

- A: $1/2\ L\ I^2$
- B: $1/2\ L^2\ I$
- C: $1/2\ L^2I^2$
- D: $1/2\ LI$

4. The induced e.m.f. in A.C generator is with N turn in the coil is?

- A: $\varepsilon = NvBL \sin \Theta$
- B: $\varepsilon = 2NvBL \sin \Theta$
- C: $\varepsilon = 2NBL \sin \Theta$
- D: $\varepsilon = NBL \sin \Theta$

5. Lamination of lamina core of transformer is to decrease its ?

- A: Electric Resistance
- B: Hysteresis
- C: Eddy current
- D: Inductance

6. An inductor is a circuit element that can store energy in the form of ?

- A: Magnetic field
- B: Electric flux
- C: Electric field
- D: Both A & B.

7. A transformer is said to be 100% efficient if ?

- A: Output voltage = Input voltage
- B: Output current = Input current
- C: Output power = Input power
- D: All given conditions must satisfy.

8. In the motional e.m.f the mechanical energy consumed is converted into ?

- A: Heat energy
- B: Internal energy
- C: Steam energy
- D: None of the above.

9. Magnetic compass needle will be deflecting, if it is kept near ?

- A: Static charge
- B: Soft iron
- C: Semi conductor
- D: Accelarating charge

10. The coil in A.C generator rotates with rotational speed of 10 rad/sec its frequency is ?

- A: $2\pi\ s^{-1}$
- B: $5\pi\ s^{-1}$
- C: $10/\pi\ s^{-1}$
- D: $5/\pi\ s^{-1}$

11. Generator converts?

- A: Mechanical energy to electrical energy only in AC generators.
- B: Mechanical energy to electrical energy only in DC generators.
- C: Mechanical energy to electrical energy in both DC and AC generators.
- D: Electrical energy to mechanical energy in both DC and AC generators.

12. The application of mutual induction is a ?

- A: Television
- B: Radio
- C: D.C. motor
- D: Transformer

13. In Pakistan the frequency of A.C is?

- A: 50Hz
- B: 100Hz
- C: 150Hz
- D: 220Hz

14. Lenz's law is consistent with the law of conversation of?

- A: Momentum
- B: Energy
- C: Charge
- D: All of the above.

15. A transformer is a device which step up or stop down?

- A: Energy
- B: Power
- C: Voltage
- D: Resitance.

16. The priciple of transformer is?

- A: Amperes law
- B: Mutual induction
- C: Motional e.m.f.
- D: Electric field variation.

17. Mutual inductance in secondary coil is due to?

- A: Current in the primary coil
- B: Current in the secondary coil
- C: Rate of change of current in secondary coil
- D: Rate of change of current in primary coil

18. The coil arrangement used in the generator is called ?

- A: Commutators
- B: Slip rings
- C: Armature
- D: Split rings

19. The relation of motional e.m.f. is?

- A: $\varepsilon = vBL (\text{Sin } \Theta)$
- B: $\varepsilon = - vBL (\text{Sin } \Theta)$
- C: $\varepsilon = - qvB (\text{Sin } \Theta)$
- D: $\varepsilon = - vBL (\cos \Theta)$

20. One Henry mutual induction is numerically equal to the e.m.f induced in the secondary coil when the rate of change is?

- A: One ampere per second in secondary coil
- B: One ampere per second in primary coil
- C: One unit per second change of magnetic flux in secondary coil.
- D: One unit per second change of magnetic flux in primary coil.

TEST-2

1. **In a coil, if current changes from 10 A to 2 A in 0.1 sec, induced emf is 3.28 V. What is self-inductance of coil?**

   - A: 4 H
   - B: 0.4 H
   - C: 0.04 H
   - D: 0.08 H

2. **A transformer changes 12V to 1800V and there are 6000 turns in secondary coil, the no. of turn on primary coil is?**

   - A: 40
   - B: 20
   - C: 10
   - D: 2

3. **What energy is stored in an inductor of 40mH, when a current of 8 A passing through it ?**

   - A: 260 mJ
   - B: 1.3 J
   - C: 1.6 mJ
   - D: 2.3 J

4. **Induced e.m.f is?**

   - A: Directly propotional to change in magnetic flux
   - B: Directly propotional to rate of change of flux
   - C: Inversely propotional to change in flux
   - D: It is not dependent on magnetic flux

5. **A.C and D.C have same?**

   - A: Effect in charging a capacitor
   - B: Effect in charging a battery
   - C: Effect while passing through an inductor
   - D: Heating effect through a resistor

6. **Mechanical energy required to keep the coil of a generator rotating?**

   - A: Is independent of the speed of the coil.
   - B: Increases with the speed of the coil.
   - C: Decreases with the speed of the coil.
   - D: Depends on the magnets used in the motor.

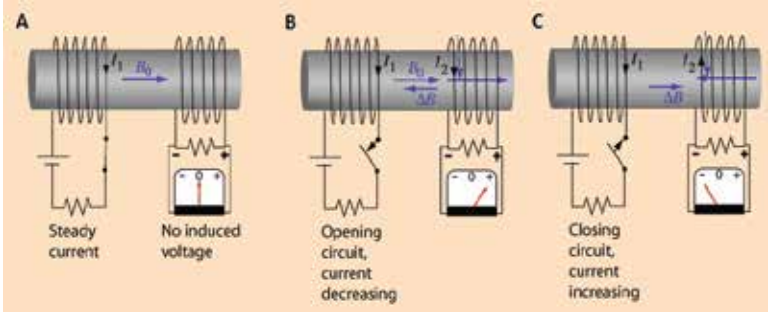
7. **A wire with loop of 1000 turns has self inductance of 2H. What is the flux (in Wb) through each turn of the coil when current of 6A is flowing?**

   - A: $1.2 * 10^{-2}$ Wb.
   - B: $2.4 * 10^{-3}$ Wb.
   - C: $3.0 * 10^{-4}$ Wb.
   - D: Not enough information given.

8. The eddy current in transformers results in?

- A: Short circuit in transformers.
- B: Heating of core.
- C: Higher efficiency for step up transformers.
- D: Higher efficiency for step down transformers.

9. Which of the following arrangement shall have an induced emf?



- A: A only
- B: C only
- C: B and C only.
- D: All of them

10. The self inductance is defined as?

- A: L = (N*I) / Φ
- B: L = Φ / I
- C: L = (NΦ) / I
- D: L = (N*I) / Φ

11. Core in transformers is laminated with insulation between layers in order to?

- A: Reduce hysteresis losses.
- B: Reduce risk of shock from the transformer.
- C: Reduce eddy currents.
- D: Increase setp up voltage.

12. Consider a flat square coil with N = 5 loops. The coil is 20 cm on each side, and has a magnetic field of 0.3 T passing through it. The plane of the coil is perpendicular to the magnetic field. If nothing is changed, what is the induced emf?

- A: 30 V
- B: 18 V
- C: 1.5 V
- D: Zero V

13. If rate of change of current is increased by four times. Self induced emf?

- A: Increase by 2 times.
- B: Decrease by 2 times.
- C: Increase by 4 times.
- D: Remains same.

14. A 50 mH coil carries a current of 2 A. Then, the energy stored in joule is?

- A: 0.05 J
- B: 0.08 J
- C: 0.1 J
- D: 5 J

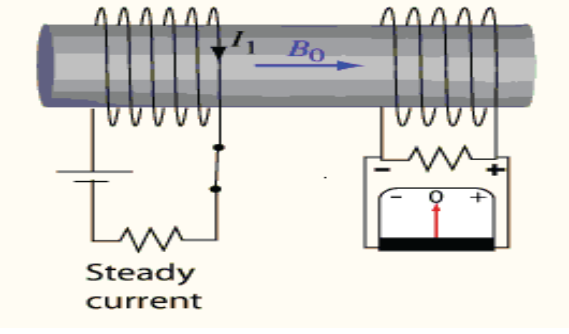
15. Which of the following is the proper way to study the sinusoidal wave form of voltage?

- A: Voltage is connected to 'X' input and time base is switched off
- B: Voltage is connected to 'Y' input and time base is switched off
- C: Voltage is connected to 'X' input and time base is switched on
- D: Voltage is connected to 'Y' input and time base is switched on

16. If a 3cm of wire is moved at right angle to the magnetic field with a speed of 2 m/sec and if flux density is 5 Telsa, what is the magnitude of induced e.m.f ?

- A: - 0.03v
- B: - 0.3v
- C: - 0.6v
- D: - 10v

17. What is the induced emf in the given circuit?



- A: Zero
- B: $-\Phi B_0 I_1$
- C: $-\Phi B_0 / I_1$
- D: We need information about number of turns to answer the question.

18. To minimize the power losses in the transmission lines ?

- A: High current low voltage is used
- B: High voltage low current is used
- C: Due to AC current power loss is zero.
- D: Conductor is made thicker.

19. In mutual induction, the mutual inductance of the two coils depends upon ?

- A: Number of turns
- B: Area of cross section of coil
- C: The distance between the two coils
- D: All of them

20. If a current of 30 A flowing in the primary coil is made zero in 0.1 sec and the emf induced in the secondary coil is 15 volt. What is the mutual inductance between the coils?

- A: 0.05 H
- B: 1.05 H
- C: 0.1 H
- D: 0.2 H

TEST-3

1. **If a rectangular loop passes with velocity v above an infinite region with uniform magnetic flux density Φ and intensity B then the induced emf on the loop is?**

   - A: -vB * area of the loop
   - B: -vΦ * area of the loop
   - C: Infinite
   - D: Zero

2. **The back motor effect?**

   Enhances motor efficiency

   Reduced torque of the motor.

   Results in energy losses.

   - A: i only
   - B: iii only
   - C: i and ii only
   - D: ii and iii only.

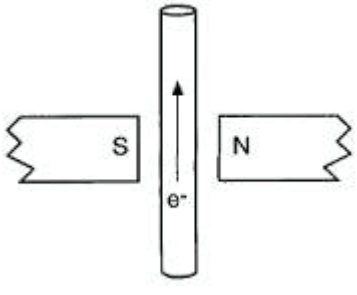
3. **If two inductances are joined in parallel, the equivalent inductance is 2.4 H, and it becomes 10 H, if they are joined in series. Then, the difference between both of them will be?**

   - A: 2 H
   - B: 4 H
   - C: 5 H
   - D: 10 H

4. **A transformer has an efficiency of 80%. It is connected to a power input of 5 kW at 200 V. If the secondary voltage is 250 V, the primary and secondary currents respectively are?**

   - A: 25 A and 20 A
   - B: 20 A and 16 A
   - C: 25 A and 16 A
   - D: 40 A and 25 A

5. **The diagram shows a wire, carring current 'I', placed between poles of a magnet:**



In which direction does the force on the wire act?

- A: Towards the 'N' pole of the magnet
- B: Outwards
- C: Inwards
- D: Towards the 'S' pole of the magnet